
Contribution ID: **160** Type: **Poster**

# Spiral Scattering of Relativistic Particles in a Bent Crystal

*Thursday, 29 September 2016 18:40 (1 hour)*

Spiral Scattering of Relativistic Particles in a Bent Crystal
G.V. Kovalev
School of Mathematics, University of Minnesota, Minneapolis, MN 55455,USA

The spiral scattering of charged particle occurs due to the appearance of a negative logarithmic singularity of the classical deflection function $\chi(b)$ of a particle for a certain impact parameter $b = bs$[1,2]. Resonance scattering [3] is a quantum-mechanical analog of spiral scattering [2] and can be considered as a general effect which includes the wide class of quantum-mechanical phenomena. In particular, it can appear in the scattering of relatively slow particles by a cylindrical well (see, e.g., [3]), whereas the classical spiral scattering by such a potential is absent [4]. The spiral scattering is also different from channeling motion where the particle undergoes periodic reflection from the wall of atoms of the lattice.
The present work illustrates this feature and several others and
determine the spiral scattering boundaries using more real potentials than in [2]. As was pointed in [2] the the spiral scattering has the optimal range $\Delta bs$ and this range is analyzed for real potentials. For real smooth potential, the spiral scattering still exists, but the character of singularity is different from the logarithmic singularity considered by Ford and Wheeler [1]. In this case the real potential has inflection point and this gives the inverse square root singularity. Therefor, in this case the spiral scattering and deflection should take place too.

References

[1] K. W. Ford and J. A. Wheeler, Ann. Phys. 7, 259 (1959).
[2] G.V.Kovalev, JETP Letters, 89, No. 6, 265, (2009).
[3] N.P.Kalashnikov, G.V.Kovalev, JETP Letters, 29, 302, (1979).
[2] G.V.Kovalev, JETP Letters, 87, 94, (2008).

**Primary author:** Dr KOVALEV, Gennady (U of M)

**Presenter:** Dr KOVALEV, Gennady (U of M)

**Session Classification:** PS3: Poster session